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Modest macroeconomic effects of monetary policy shocks during the great moderation: An alternative interpretation

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ABSTRACT

Cholesky-VAR impulse responses estimated with post-1984 U.S. data predict modest macroeconomic reactions to monetary policy shocks. We interpret this evidence by employing an estimated medium-scale DSGE model of the business cycle as a Data-Generating Process in a Monte Carlo exercise in which a Cholesky-VAR econometrician is asked to estimate the effects of an unexpected, temporary increase in the policy rate. Our structural DSGE model predicts conventional macroeconomic reactions to a policy shock. In contrast, our Monte Carlo VAR results replicate our evidence obtained with actual U.S. data. Hence, modest macroeconomic effects may very well be an artifact of Cholesky-VARs. A combination of supply and demand shocks may be behind the inability of Cholesky-VARs to replicate the actual macroeconomic responses. The difference in the VAR responses obtained with Great Inflation vs. Great Moderation data may be due to instabilities in the parameters related to households' and firms' programs, more than to a more aggressive systematic monetary policy. A Monte Carlo assessment of sign restrictions as an alternative identification strategy is also proposed.

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1. Introduction

Vector Autoregression (VAR) empirical investigations dealing with U.S. data have often found modest macroeconomic effects of monetary policy shocks during the great moderation (see, among others, Bagliano and Favero, 1998; Hanson, 2004; Boivin and Giannoni, 2006; Mojon, 2008; Castelnuovo and Surico, 2010, and Boivin et al., 2010). Fig. 1 replicates this evidence.[1] The bottom panels point to a non-significant reaction of output, and to a short-lived negative response of inflation. Very different results are typically obtained when dealing with samples including the 1970s, and our dataset represents no exception. The top panels in Fig. 1 show a significant and positive reaction of inflation (known as the 'price puzzle') and a negative and persistent response of output as in, e.g., Christiano et al. (2005) .

Various interpretations have been given to such 'mild-to-muted' reactions. Hanson (2004) discusses the role possibly played by the change in the systematic policy conduct of the Federal Reserve occurred with the advent of Paul Volcker in 1979, or by a

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[1] Evidence obtained with a trivariate VAR including quarterly GDP deflator inflation, a measure of the output gap produced by the Congressional Budget Office, and the federal funds rate (average of monthly observations). Giordani (2004) shows that the estimated responses to a monetary policy shock are likely to be biased if a measure of potential output is omitted from the VAR. Robustness checks documented in our Appendix suggest that this qualitative message does not change if a measure of output growth is employed in our VARs. Boivin and Giannoni (2006) and Boivin et al. (2010) confirm this evidence with Factor-Augmented VARs embedding information coming from large datasets.

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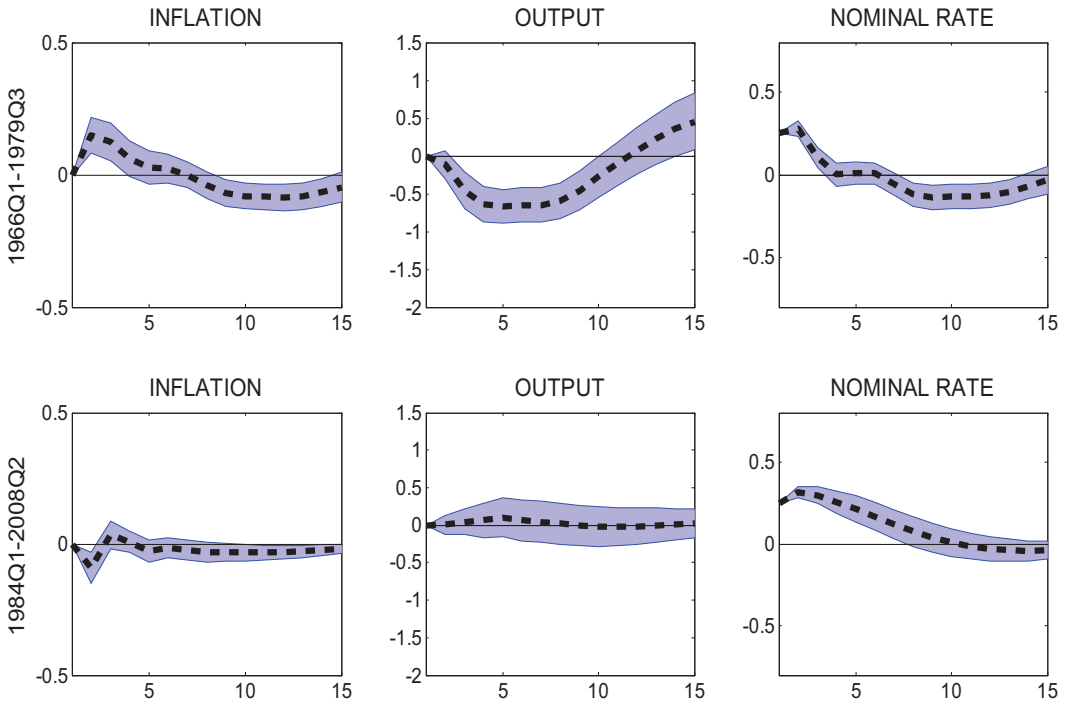

Fig. 1. VAR impulse response functions to a monetary policy shock. Actual U.S. data, great inflation vs. great moderation. Variables: Quarterly GDP inflation, output gap, quarterly federal funds rate - source: FREDII. Identification of the monetary policy shock via Cholesky decomposition (lower triangular matrix, ordering: Inflation, output gap, federal funds rate). Dashed black lines: Mean responses. Shaded areas: [16th, 84th] percentiles (bootstrapped, 500 repetitions). VAR estimated with a constant, a linear trend, and three lags.

milder volatility of output during the great moderation. Boivin and Giannoni (2006) and Castelnuovo and Surico (2010) underline the role that technological progress or financial innovations may have played in easing households' consumption smoothing, or - again - the improved monetary policy management in the 1980s. Boivin et al. (2010) also point to financial innovations and a more hawkish monetary policy conduct as possible drivers behind the much more moderate macroeconomic reactions in the post-1984 period.[2]

This paper provides an alternative interpretation to the modest reactions shown in Fig. 1. We do so by conducting a Monte Carlo exercise in which the Smets and Wouters (2007) model, a reference Dynamic Stochastic General Equilibrium (DSGE) framework for a large number of central banks in the world, is employed as the Data-Generating Process (DGP) to produce artificial data which are then given to a Cholesky-VAR econometrician. The Cholesky-VAR econometrician is asked to identify the macroeconomic responses of output and inflation to a monetary policy shock. We show that mild-to-muted responses are very likely to arise even if, in the Smets and Wouters (2007) framework, monetary policy shocks exert recessionary and deflationary effects. Consequently, a possible interpretation of our responses plotted in Fig. 1 (bottom panels) is that modest-to-muted impulse responses may very well be an artifact due to the use of Cholesky-VARs by econometricians. We show that such an artifact is due to the timing discrepancy between the actual (unknown to the econometrician) DGP and the Cholesky-VAR. In fact, while the DSGE model allows for immediate output and inflation responses to a monetary policy shock, the zero-restrictions imposed by the Cholesky-identification schemes prevent any immediate response of output and inflation to occur. This time discrepancy induces a distortion in the estimation of the policy shocks, which end up being a linear combination of genuine monetary policy shocks and all the remaining non-policy, structural shocks affecting the economic system. Therefore, Cholesky-VARs pick up a combination of demand and supply shocks for which the net effect on inflation and output induces the modest reactions shown in Fig. 1 (bottom panels).

Is there any structural reason behind the instabilities in the impulse responses depicted in Fig. 1? We address this question by estimating our DGP with U.S. data referring to the great inflation period. Our posterior estimates document instabilities in the parameters related to households' and firms' problems, to the systematic monetary policy conduct, and to the exogenous processes of the structural shocks in the model. Counterfactual simulations are then performed to isolate the subset of parameters

[2] Mojon (2008) shows that, once one examines periods without large shifts in the level of inflation such as the great moderation, the delayed and persistent effects on inflation often attributed to monetary policy shocks tend to disappear. Other 'econometric' interpretations involve small-sample bias issues, which might be severe in a sample like ours, and the misspecification of the monetary policy shock due to the underestimation of the set of variables the Federal Reserve may have reacted to. On this latter point, see (Barakchian and Crowe, 2013), who employ monthly data in their analysis. The relevance of their results at quarterly frequencies for the great moderation sample is material for future research.

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